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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/679,521	10/06/2003	Charles J. Neef	32850	3997

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EXAMINER	
ASHTON, ROSEMARY E	
ART UNIT	**PAPER NUMBER**
1752	

DATE MAILED: 09/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	**Application No.** 10/679,521	**Applicant(s)** NEEF ET AL.
	Examiner Rosemary E. Ashton	**Art Unit** 1752

of

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 August 2004*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-56* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-18,24,26-31,44,45,47,52-54 and 56* is/are rejected.
7)☒ Claim(s) *19-23,25,32-43,46 and 48-51,55* is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☒ The drawing(s) filed on *06 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

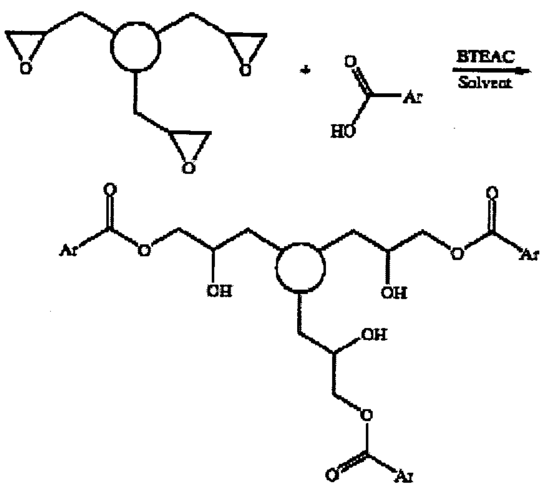
Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 4-11,30,31 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for compounds having the formula XC(O)OCH2C(OR)CH2-, does not reasonably provide enablement for compounds having an epoxy group. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the invention commensurate in scope with these claims. As shown on pages 3 and 4 of the specification the precursor epoxy compound is reacted with an acid to form compounds having the formula above. Claims 4 and 30 read on a compound having epoxy moieties which are **not** taught in the specification for the final product but as a starting material. Specifically, see scheme A on page 4 which is repeated below. The epoxy compounds in section 10 of the instant application are precursor compounds and not used in the ARC composition.

Schema A



3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 8,10,11,31are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 8,10 and claim 31 read on claim 4 and claim 30, respectively. Claims 4 and 30 state the compounds have epoxy groups, however, the formulas in dependent claims 8,10 and 31 do not have epoxy groups.

5. Claims 8,10,11,16-18,20-23,31-39,41-43,48-53,55 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 8,10,16,20,31,32,41,48,52,55 have formulas with a circle that is not defined in the claim, thus the claims have no meaning and the examiner rejects these claims as well as their dependent claims. For searching the examiner used the definition of the circle in claim 9.

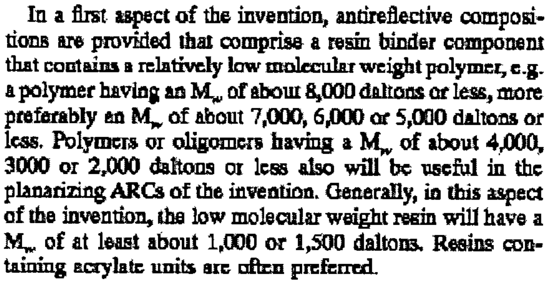
Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1-3,12-15,24,26-29,44,45,47 are rejected under 35 U.S.C. 102(e) as being anticipated by Pavelchek et al U.S. patent no. 6,316,165.

Pavelchek teaches a planarizing antireflective coating (ARC) for use with a photoresist and photolithographic method. As shown in col. 2, below, the polymer in the ARC has a low molecular weight of less than 8,000. The polymers in examples 3 and 4 of the patent (col. 16) have a molecular weight of less than 5,000.



In a first aspect of the invention, antireflective compositions are provided that comprise a resin binder component that contains a relatively low molecular weight polymer, e.g. a polymer having an M_w of about 8,000 daltons or less, more preferably an M_w of about 7,000, 6,000 or 5,000 daltons or less. Polymers or oligomers having a M_w of about 4,000, 3000 or 2,000 daltons or less also will be useful in the planarizing ARCs of the invention. Generally, in this aspect of the invention, the low molecular weight resin will have a M_w of at least about 1,000 or 1,500 daltons. Resins containing acrylate units are often preferred.

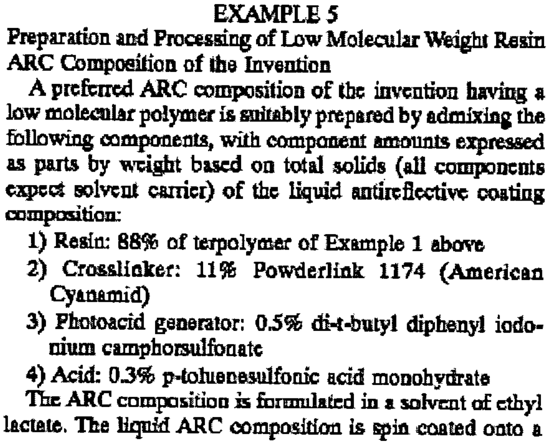
As shown in example 5 the composition comprises the polymer, a crosslinker such as the aminoplast Powderlink 1174, a photoacid generator (PAG) and an acid. The composition is mixed with ethyl lactate as a solvent, coated on a silicon substrate, heated to 175 deg. C, exposed to radiation, developed and etched as in claims 24,26-29.

While Pavelchek does not exemplify the polymers from examples 3 and 4 in a photoresist composition one clearly envisions using these polymers in a photoresist composition having the same reagents as example 5 and processing the photoresist by the same method taught in example 5 because Pavelchek only exemplifies 4 polymers, two with molecular weights greater than 5000 (example 1, mol. wt. 8355, ex. 2, mol. wt. 6304) and two with mol. wt. less than 5000 (ex. 3, mol.wt. 2337, ex. 4, mol.wt. 4963). Thus, do to the limited number of polymers one envisions using each of them in an ARC. The ARC compositions using the polymers of ex. 3 and ex. 4 have at least 98 % of the components in the ARC composition with a molecular weight of less than 5,000 g/mole. In ex. 5 using the polymer of ex. 3 the amount will be 100 %.

As to claim 3: 2,337 is a mol.wt. "**of less than about** 2,000".

The crosslinker component Powderlink 1174 and the acid component p-toluenesulfonic acid in the composition of ex. 5 (below) are identical to the components taught on page 6 of the instant application.

The photoacid generator in ex. 5 has a mol. wt. of 624 and thus the components meet the limitations of claims 1-3 in that at least about 98 % of said components have a mol.wt. of less than about 5,000 and at least about 95 % of said components have a mol.wt. of less than about 2,000.



EXAMPLE 5

Preparation and Processing of Low Molecular Weight Resin ARC Composition of the Invention

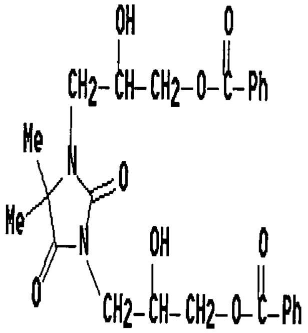
A preferred ARC composition of the invention having a low molecular polymer is suitably prepared by admixing the following components, with component amounts expressed as parts by weight based on total solids (all components expect solvent carrier) of the liquid antireflective coating composition:

1) Resin: 88% of terpolymer of Example 1 above
2) Crosslinker: 11% Powderlink 1174 (American Cyanamid)
3) Photoacid generator: 0.5% di-t-butyl diphenyl iodonium camphorsulfonate
4) Acid: 0.3% p-toluenesulfonic acid monohydrate

The ARC composition is formulated in a solvent of ethyl lactate. The liquid ARC composition is spin coated onto a

8. Claims 52-54,56 are rejected under 35 U.S.C. 102(b) as being anticipated by Chemcats Abstract AN 2002:2742256 published 9 July 2002.

The abstract teaches the compound below which meets the limitations of claims 52-54 and 56 wherein Ph is a benzene ring.



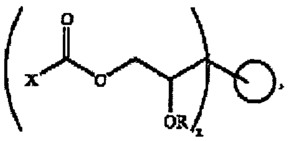
Allowable Subject Matter

10. Claims 17,18,20-23,33-39,41-43,49-51, ,55 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

11. Claims 16,32,48 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

12. Claims 19,25,40,46,50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not teach an ARC, a method of lithography and a precursor structure (the latter two using the ARC) having the compound below as in claims 16,32 and 48; an ARC, a method of lithography and a compound where O in formula I below is limited to the groups defined in claims 19,40,54; wherein the substrate has vias as in claim 25 and wherein the absorbance of the ARC layer is about 95 % at 193 nm and the layer has a thickness of about 320 angstroms as in claims 46 and 50. Claims 17,18,20-23,33-39,41-43,49-51,54,55 would be allowable if rewritten to overcome the under 35 U.S.C. 112, 2nd paragraph, set forth in this Office because not art was found reading on the compound of formula I in an ARC.

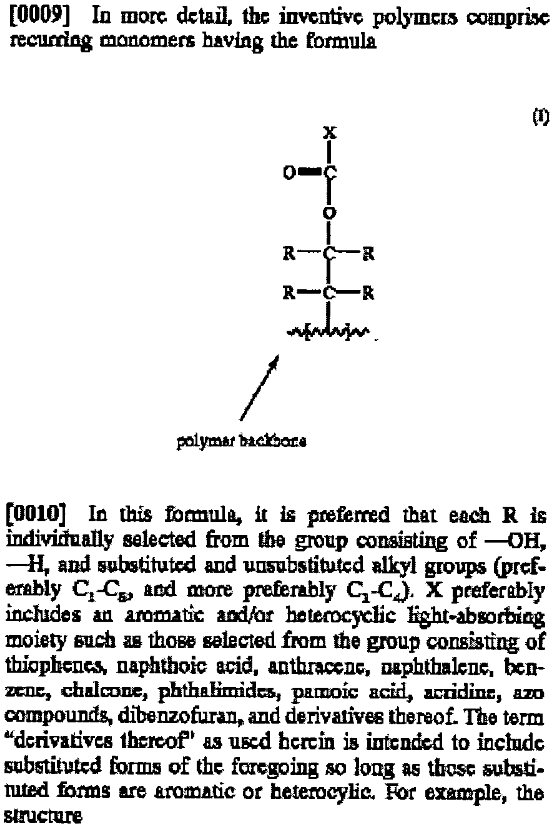


(I)

[0015] where each X is a chromophore, each R is selected from the group consisting of hydrogen and C_1-C_8 alkyl groups, and n is at least 2 (more preferably at least 3). X is preferably selected from the group consisting of benzene, anthracene, naphthalene, and alkyls (preferably C_1-C_{12}, and more preferably C_1-C_8).

Conclusion

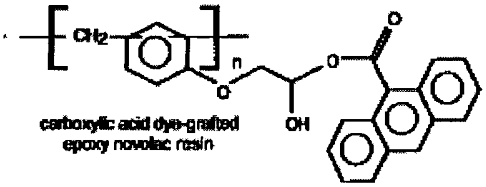
14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Deshpande (U.S. patent application publication no. US 2003/0162125) and Flaim et al (U.S. patent no. 5,919,598) each teach an ARC having a polymer comprising applicant's functional group found in claim 8 of the instant application. As shown below, when R in Deshpande or Flaim is H and OH the formula is the same as in claim 8. However, neither Deshpande nor Flaim teach the functional group is in a compound but teach it is in a polymer and they do not specifiy there is more than one group.


(I)
X
O
C
O
R
C
R
R
C
R
polymer backbone

[0009] In more detail, the inventive polymers comprise recurring monomers having the formula

[0010] In this formula, it is preferred that each R is individually selected from the group consisting of —OH, —H, and substituted and unsubstituted alkyl groups (preferably C_1-C_8, and more preferably C_1-C_4). X preferably includes an aromatic and/or heterocyclic light-absorbing moiety such as those selected from the group consisting of thiophenes, naphthoic acid, anthracene, naphthalene, benzene, chalcone, phthalimides, pamoic acid, acridine, azo compounds, dibenzofuran, and derivatives thereof. The term "derivatives thereof" as used herein is intended to include substituted forms of the foregoing so long as those substituted forms are aromatic or heterocylic. For example, the structure

Deshpande, section 9-10



Flaim et al., Figure 2

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosemary E. Ashton whose telephone number is 571-272-1326. The examiner works a 6 hr. daily work schedule and can normally be reached M-F between 11:30 am and 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached at 571-272-1526.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

R E Ashton

Rosemary E. Ashton
Primary Examiner
Art Unit 1752

rea
September 13, 2004

ROSEMARY ASHTON
PRIMARY EXAMINER